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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/712,795	11/14/2000	Harold G. Craighead	1153.010US1	8906

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EXAMINER
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CHEU, CHANGHWA J

ART UNIT	PAPER NUMBER
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1641

DATE MAILED: 01/14/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/712,795

Applicant(s)

CRAIGHEAD ET AL.

Examiner

Jacob Cheu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 October 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) 1-61 is/are pending in the application.
- 4a) Of the above claim(s) 27-61 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

***Election/Restrictions***

1. Applicant's election of Group I (claims 1-26) in Paper No. 5 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Therefore claims 27-61 are withdrawn from further consideration by the Examiner.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:
- The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claims 7, 9, 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 7, "said binding partner is immobilized near said second end of said structure," is vague and indefinite. It is unclear how "near" the binding partner to the second end of the structure.

With respect to claim 9, "wherein said immobilized portion is rigidly coupled to support," is vague and indefinite. It is unclear how "rigid" the immobilized portion has to coupled to the support.

With respect to claim 21, "includes a complementary DNA sequence," is vague and indefinite. It is suggested that applicant inserts "said" prior to the DNA sequence for better clarity.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-3, 6-7, 9-19, 21, 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lang et al. (Appl. Phys. A (1998) 66: S61-64) in view of Baselt et al. (J. Vac. Sci. Technol. (1996) 14: 789-793)

Lang et al. teach identifying gases or vapors, e.g. H<sub>2</sub> or alcohols, having a mass by an immobilized portion structure adapted a second portion for resonating, wherein illuminating on the second portion with a light source in an ambient condition based on a frequency of the mass of the gases or vapors, and measuring the light deflection by a photodetector and providing the change of light deflection through voltage signal to a spectrum analyzer and processor. (See Figures 1 and 2; page S61, right column, second paragraph) Lang et al. also teach using the cantilever beam, i.e. 500 µm long, as the detecting means, wherein this device can be operated under ambient air, vacuum, liquid, and thermal noise. (S 61 right column, second paragraph; S

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63, left column, end of last paragraph) However, Lang et al. do not explicitly teach (1) immobilization of binding partners that bind to the various analytes on the portion on the device, such as pathogen, bacteria, virus, ligand, protein or DNA; (2) using a piezoelectric drive for the device.

Baselt et al. teach using a piezoelectric cantilever coated with binding partners, e.g. antibodies for detecting of biological species, such as proteins, toxins, virus, DNA and ligands. (See Abstract; Section of Force Transducer; Cited Reference 5) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Lang et al. by immobilizing binding partners on the device as taught by Baselt et al., in order to detect multiple biological species, such as microorganism, protein, DNA and metallic iron-containing analytes, in a sample of interest.

7. Claim 20 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Lang et al. in view of Baselt et al. as applied in claims 1-3, 6-7, 9-19, 21, 22, 24 and, further in view of Lee et al. (USP 5807758).

Both Lang et al. and Baselt et al. references have been discussed above but fail to explicitly teach using a chelator as binding partner to bind a metallic iron analyte. Nevertheless, Lee et al. teach using the chelators as the recognizing and selectively binding molecules for metal irons in an immunoassays of analytes of interests. (See column 1, line 35-45) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the modified system of Lang and Baselt et al. with the chelator as binding partners as taught by Lee et al., in order to detect metallic iron in a sample of interest.

8. Claims 4, 5, 8 and 23 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Lang et al. in view of Baselt et al., as applied to claims 1 and 22, and further in view of Quate et al. (USP 6203983).

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Lang et al. and Baselt et al. references have been discussed but are silent as to teach using split photodiode, silicon cantilever and out of plane mode (i.e. vertical) vibrating cantilever beam. Quate et al. teach using split photodetectors, silicon-based composition for biosensor and different modes of cantilever vibration, i.e. vertical mode. (See Column 2, line 12-20; Column 3, line 20-29; Column 5, line 60-65) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of Lang et al. with the modified split photodiode, silicon cantilever and out of plane vibrating mode as taught by Quate et al., as an alternative form of detecting analytes using micromechanical biosensor since it is considered conventional in the art.

9. Claim 25 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Lang et al. in view of Baselt et al., as applied in claim 1, and further in view of Carr et al. (J. Vac. Sci. Technol. B (1997) 15: 2760-2763)

Lang et al. reference has been discussed but is silent to the structure recited as claim 25. Carr et al. teach exploring the physical designs of the micromechanical sensor device as to modulate light and minimize interference effect. (See page 2760, Section IV) Carr et al. disclose several linear device structures all having a first end, a second end, and a middle region. (See Figures 2-4) Carr et al. also suggest that these devices would be useful in chemical sensing or detection of small forces by adsorbing materials unto the middle region of the device, i.e. resonating paddle. (See page 2762, left Column, second paragraph; Conclusion) Therefore, it would have been obvious to one of ordinary skill in the art to provide the system of Lang et al. with a mechanical sensor as taught by Carr et al., for the benefits of optimal detection of analyte using micromechanical cantilever method.

10. With respect to claim 26, applicants recite a disk-shaped member having a perimeter and a center region. It would have been an obvious matter of design choice to have the instant recited disk-shaped for analysis, since such a modification would have been involved a mere change in the shape of a component. A change in the shape is generally recognized as being within the level of ordinary skill in the art. ~~In re Rose~~, 105 USPQ 237 (CCPA 1955)

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***Conclusion***

11. No claim is allowed.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob Cheu whose telephone number is 703-306-4086. The examiner can normally be reached on 8:30-5:00.

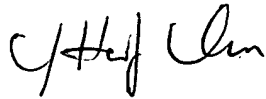
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 703-305-3399. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-4242 for regular communications and 703-308-4242 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3399.

Jacob Cheu

Examiner

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January 13, 2003



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1/13/03